

Poster 38

## Butylone effects on the behaviour of zebrafish (*Danio rerio*) larvae

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### Abstract

**Background:** New psychoactive substances (NPS) represent an increasing human health and environmental concern. Despite the efforts to control their production and consumption, new molecules are identified every year. Consequently, their presence in water bodies has been reported raising concern due to potential negative impacts on non-target species such as fish [1], including the synthetic cathinone butylone (BTL) [2]. No information was found regarding its effects on exposed fish, like *Danio rerio*. This vertebrate is a valorous animal model in numerous areas of toxicology research, particularly to investigate the potential adverse effects of NPS during early-life stages [3]. **Objective:** This study aims to assess the potential effects of BTL on zebrafish larvae behaviour. **Methods:** *D. rerio* embryos with approximately 3 hours post-fertilization (hpf) were exposed until 96 hpf in triplicate to different concentrations of BTL (0.01, 0.1, 1, 10 and 100 µg/L). At 120 hpf, behavioural parameters were assessed in larvae: speed, distance to the centre of the well, absolute turn angle, total distance moved and active time. **Results:** Overall, an increase in speed, absolute turn angle and total distance moved was observed for the organisms exposed to the higher concentrations 1 and 10 µg/L compared with the control group; however, no statistical differences were observed. **Conclusions:** No changes were found on swimming behaviour of the larvae exposed at the selected BTL concentrations. Furthermore, these concentrations are much higher than the environmental relevant concentrations (0.01 µg/L) usually found. These findings suggest that the exposure to environmental relevant concentrations of BTL during early life stages should not affect early life stages of wild fish. Further research is necessary to study the effects of BTL on fish under chronic exposure to estimate the potential impacts on wild fish populations and improve risk assessment.

**Keywords:** new psychoactive substances; butylone; zebrafish larvae; behaviour

### Acknowledgments

This work was financially supported by Portuguese National Funds by Foundation for Science and Technology (FCT), under the project PTDC/CTA-AMB/6686/2020 (ENANTIOTOX) and UIDB/04033/2020 (CITAB/Inov4Agro). Ondina Ribeiro thanks the FCT for the PhD Grant 2022.12242.BD.

### References

1. Bade, R., et al., Quantification of new psychoactive substances in Australian wastewater utilising direct injection liquid chromatography coupled to tandem mass spectrometry. *Talanta* **2023**, *251*: p. 123767.
2. Spálovská, D., et al., Structure determination of butylone as a new psychoactive substance using chiroptical and vibrational spectroscopies. *Chirality* **2018**, *30*(5): p. 548-559.
3. Ribeiro, O., et al., Effects of acute metaphedrone exposure on the development, behaviour, and DNA integrity of zebrafish (*Danio rerio*). *Environ. Sci. Pollut. Res.* **2023**, p. 1-10.



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